## REMARKS

Claims 1, 3-44 and 92-110 are pending in this application. Applicants acknowledge with appreciation the allowance of claims 4-9, 12-44 and 92-110.

Claims 1, 3 and 11 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Hu et al., *Characteristics of Trenched Coplanar Waveguide For SiMMIC Applications*, 1997 IEEE MTT-S Digest ("Hu") in view of Solon Spiegel et al., *Impact of Light Illumination and Passivation Layer on Silicon Finite-Ground Coplanar-Waveguide Transmission-Line Properties*, 2000 IEEE ('Spiegel") and further in view of Wolf et al., *Silicon Processing for the VLSI Era* ("Wolf"). This rejection is respectfully traversed.

Amended independent claim 1 recites a method of "forming a coplanar waveguide" by *inter alia* "depositing an insulating material on a substrate," "forming a signal conductor line over said insulating material" and "forming two longitudinal ground conductor planes over said substrate and on opposing sides of said signal conductor line, said ground conductor planes being spaced from said signal conductor line." Amended independent claim 1 also recites that "the acts of forming said signal conductor line and at least one of said ground conductor planes further comprise forming a barrier layer over said insulating layer and depositing a conductive material on top of said barrier layer." Amended independent claim 1 further recites "subsequently etching said substrate to form a trench in said substrate in an area between at least one of said ground conductor planes and said signal conductor line."

Hu relates to a "novel low loss trenched aluminum CPW (coplanar waveguide) transmission line structure, fabricated on a selection of high, medium and low resistivity silicon substrate materials." (Abstract). Hu teaches that "[b]y lowering the dielectric constant of the substrate at the edges of the strip and ground conductors,

current crowding at the edges can be reduced and hence conductor loss reduced." (page 735).

Spiegel relates to the "[m]odeling of silicon finite-ground coplanar-waveguide (FGCPW) transmission lines." (Abstract). According to Spiegel, "removing the passivation layer from the slot areas leads to a reduction of the surface charge" to form silicon FGCPW transmission lines. (page 1673-74).

Wolf teaches chemical reactions for silicon oxide formation. Wolf mentions that "[t]here are various reactions that can be used to prepare CVD $SiO_2$."

The subject matter of claims 1, 3 and 11 would not have been obvious over Hu in view of Spiegel and Wolf. Specifically, the Office Action fails to establish a *prima facie* case of obviousness. Courts have generally recognized that a showing of a *prima facie* case of obviousness necessitates three requirements: (i) some suggestion or motivation, either in the references themselves or in the knowledge of a person of ordinary skill in the art, to modify the reference or combine the reference teachings; (ii) a reasonable expectation of success; and (iii) the prior art references must teach or suggest all claim limitations. See e.g., In re Dembiczak, 175 F.3d 994 (Fed. Cir. 1999); In re Rouffet, 149 F.3d 1350, 1355 (Fed. Cir. 1998); Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc., 75 F.3d 1568, 1573 (Fed. Cir. 1996).

First, not all limitations of amended independent claim 1 are disclosed, taught or suggested by the prior art references, whether considered alone or in combination. Hu does not discloses, teaches or suggests "depositing an insulating material on a substrate," much less "depositing an insulating material on a substrate," "forming a barrier layer over said insulating layer and depositing a conductive material on top of said barrier layer" and "forming a signal conductor line over said insulating

material" and "two longitudinal ground conductor planes over said substrate and on opposing sides of said signal conductor line," as amended independent claim 1 recites. Hu analyses the dependence of RF losses in CPW lines on silicon substrates having trenches of various depths, and not the steps of forming the coplanar waveguide of the claimed invention.

Similarly, Spiegel fails to disclose, teach or suggest the sequence of steps of amended independent claim 1. Spiegel is silent about "depositing an insulating material on a substrate," "forming a signal conductor line over said insulating material," "forming two longitudinal ground conductor planes over said substrate and on opposing sides of said signal conductor line" by "forming a barrier layer over said insulating layer and depositing a conductive material on top of said barrier layer," and "subsequently etching said substrate to form a trench in said substrate in an area between at least one of said ground conductor planes and said signal conductor line," as in the claimed invention.

Spiegel teaches that a "1000-A $SiO_2$ layer was thermally grown on the surface of a . . . silicon substrate" and that a "composite layer, i.e., Ni-Cr-Au . . . was then deposited on the surface of the oxide and covered with photo-resist." (page 1675). Spiegel also teaches that "[following the definition of the exposed regions, a . . . galvanic gold metal was formed using electroplating techniques" so that "[f]inally, the $SiO_2$ layer was etched down using a buffered oxide etch." (page 1675). Thus, Spiegel teaches only removing the $SiO_2$ layer from between adjacent structures, and not "etching said substrate to form a trench . . . in an area between at least one of said ground conductor planes and said signal conductor line," as in the claimed invention.

Wolf also fails to disclose, teach or suggest any of the steps recited in amended independent claim 1. Wolf relates to chemical reactions for $SiO_2$ formation by

chemical vapor deposition, and not to the formation of coplanar waveguides, much less to the formation of coplanar waveguides by the specific steps recites in amended independent claim 1.

Second, to establish a *prima facie* case of obviousness, "[i]t is insufficient that the prior art disclosed the components of the patented device, either separately or used in other combinations; there must be some teaching, suggestion, or incentive to make the combination made by the inventor." Northern Telecom, Inc. v. Datapoint Corp., 908 F.2d 931, 934 (Fed. Cir. 1990). Thus, "the inquiry is not whether each element existed in the prior art, but whether the prior art made obvious the invention as a whole for which patentability is claimed." Hartness Int'l, Inc. v. Simplimatic Engineering Co., 819 F.2d 1100, 1108 (Fed. Cir. 1987). Accordingly, a determination of obviousness "must involve more than indiscriminately combining prior art; a motivation or suggestion to combine must exist." Pro-Mold & Tool Co., 75 F.3d at 1573. This way, a rejection of a claim for obviousness in view of a combination of prior art references must be based on a showing of a suggestion, teaching, or motivation that has to be "clear and particular." In re Dembiczak, 175 F.3d at 999. Thus, the mere fact that it is possible to find two isolated disclosures which might be combined to produce a new process does not render such production obvious, unless the prior art also suggests the desirability of the proposed combination.

The July 27, 2005 Office Action fails to establish a *prima facie* case of obviousness because, as the Court in Northern Telecom, Inc. noted, "[i]t is insufficient that the prior art disclosed the components of the patented device" and there is no "teaching, suggestion, or incentive to make the combination." Northern Telecom, Inc., 908 F.2d at 934. On one hand, the crux of Hu is the formation of CPW lines on silicon substrates having trenches of various depths to reduce the conductor loss. For this, Hu

teaches the formation of 3μm, 6μm, 9μm, and 12μm deep trenches in a silicon substrate as part of aluminum CPW transmission lines.

On the other hand, the crux of Spiegel is the removal of a passivation layer between the metals lines and the substrate on which FGCPW transmission lines are formed, to avoid the formation of Schottky junctions. For this, Spiegel teaches the removal of portions of a $SiO_2$ layer to form a trench of only 0.1 μm, which represents the thickness of the $SiO_2$ layer. Accordingly, a person of ordinary skill in the art would not have been motivated to combine Hu (which teaches the formation of 3μm, 6μm, 9μm, and 12μm deep trenches in a silicon substrate to form aluminum CPW transmission lines) with Spiegel (which teaches removal of $SiO_2$ layer to form trenches of only 0.1 μm to form gold CPW transmission lines).

A person skilled in the art would also not have been motivated to combine the teachings of Hu or Spiegel with those of Wolf. On one hand, and as noted above, Hu teaches the formation of deep trenches of various dimensions in a silicon substrate to form aluminum CPW transmission lines, while Spiegel teaches removal of a $SiO_2$ layer to form trenches as part of gold CPW transmission lines. On the other hand, Wolf analyses the deposition variables for the formation of $SiO_2$ layers by chemical vapor deposition. Thus, the only structure that Hu, Spiegel and Wolf have in common is the substrate on which their respective processes are conducted. For at least these reasons, the Office Action fails to establish a *prima facie* case of obviousness, and withdrawal of the rejection of claims 1, 3 and 11 is respectfully requested.

Claim 10 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Hu in view of Spiegel and further in view of Wolf and Tran (U.S. Patent No. 6,259,407) ('Tran"). This rejection is respectfully traversed.

Claim 10 depends on amended independent claim 1 and recites that the "conductive material comprises copper."

Tran relates to a "uniplanar dual strip antenna that has a two dimensional structure." (Abstract). Tran teaches that "[t]he antenna is comprised of a first and a second metallic strip, each printed or etched on a thin planar substrate" and that "[t]he first and second strips are separated by a predetermined gap and are used as conductors of a two-wire transmission line." (Abstract). Tran also teaches that "[a] coplanar waveguide is coupled to the uniplanar dual strip antenna" and that "[t]he coplanar waveguide is constructed by printing or etching metal on the substrate." (Abstract).

None of the cited references, whether considered alone or in combination, discloses, teaches or suggests all limitations of amended independent claim 1. As noted above, Hu, Spiegel and Wolf, considered alone or in combination, do not disclose, teach or suggest all the steps recited in claim 1. In addition, Tran teaches a uniplanar dual strip antenna having a two-dimensional structure, and not the steps recited in claim 1.

Applicants also submit that a person of ordinary skill in the art would not have been motivated to combine Hu, Spiegel and Wolf with Tran to arrive at the claimed invention. As noted above, Hu teaches the formation of 3μm, 6μm, 9μm, and 12μm deep trenches in a silicon substrate as part of aluminum CPW transmission lines, while Speigel relates to the removal of a passivation layer (a $SiO_2$ layer) between the metals lines and the substrate to form a trench of 0.1 μm and to avoid the formation of Schottky junctions. Wolf analyses the deposition variables for the formation of $SiO_2$ layers by chemical vapor deposition methods. The crux of Tran is "a new antenna structure and technique for manufacturing antennas . . . to achieve bandwidths more commensurate with advanced communication system demands." (Col. 2, lines 57-60).

Tran emphasizes that "the antenna structure should be conductive to internal mounting to provide more flexible component positioning within the wireless device, greatly improved aesthetics, and decreased antenna damage." (Col. 2, limes 60-63). Accordingly, the only structure that Hu, Spiegel, Wolf and Tran have in common is the substrate on which each of their elements are formed. Thus, a person of ordinary skill in the art would not have been motivated to combine these disparate references, and withdrawal of the rejections of claim 10 is also respectfully requested.

Allowance of the application is solicited.

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Respectfully submitted,

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